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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,791	07/03/2003	Jiang Hsieh	15-CT	1516
7590 08/03/2006			EXAMINER	
Patrick W. Rashe Armstrong Teasdale LLP One Metropolitan Square, Suite 2600 St. Louis, MO 63102			ARTMAN, THOMAS R	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

*[Handwritten mark]*

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/613,791	HSIEH ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Thomas R. Artman	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-21 is/are allowed.
- 6) ☒ Claim(s) 22,23,28 and 29 is/are rejected.
- 7) ☒ Claim(s) 24-27 and 30-32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 22 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Meno (US 4,716,904).

Regarding claim 22, Meno discloses a method, including:

- a) imaging a heart at a first phase of a cardiac cycle to obtain a first image,
- b) imaging a heart at a second phase of the cardiac cycle different from the first phase to obtain a second image, and
- c) determining a difference image using the first and second images (col.4, line 52 through col.5, line 23).

With respect to claim 29, Meno further discloses that an EKG signal is monitored (physiological monitor 22 of the heart 8) in order to take images at desired phases of the heart (col.3, line 52 through col.4, line 7; col.5, lines 20-23).

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Claims 22 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Haendle (US 4,433,428).

Regarding claim 22, Haendle discloses a method, including:

- a) imaging a heart at a first phase of a cardiac cycle to obtain a first image,
- b) imaging a heart at a second phase of the cardiac cycle different from the first phase to obtain a second image, and
- c) determining a difference image using the first and second images (col.1, lines 6-13 and lines 40-50).

With respect to claim 29, Haendle further discloses that an EKG signal is monitored in order to take images at desired phases of the heart (col.1, lines 6-13 and lines 40-50).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haendle.

With respect to claim 23, Haendle does not specifically disclose the practice of having the patient hold their breath during the imaging procedure.

However, it is known in the art to have the patient hold their breath during heart imaging procedures in order to remove movement artifacts caused by the lungs. This allows the image subtraction to be useful, since the stationary structures will properly cancel out, and only movement caused by the heart will remain.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Haendle to have the patient hold their breath during the imaging procedure in order to improve the difference image results by removing movement artifacts caused by respiratory motion.

With respect to claim 28, Haendle does not specifically disclose the practice of enhancing the differenced image.

However, it is known to one skilled in the art to enhance the image, such as sharpening edges, etc., in order to enhance the resultant image for better visualization by the operator/doctor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Haendle to enhance the difference image such that a cleaner, more useful image is achieved.

*Allowable Subject Matter*

Claims 1-21 are allowed.

Claims 24-27 and 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither teaches nor reasonably suggests a CT imaging system and method of use, where a difference image is determined from two CT scout scans of a region of a patient including at least a portion of a heart taken at two different phases, as required by the combination as claimed in each of claims 1 and 12.

Claims 2-11 and 13-21 are indicated under this section by virtue of their dependency.

The prior art of record neither teaches nor reasonably suggests the additional method step of identifying calcification deposits on portions of the difference image corresponding to moving body structures of the patient, as required by the combination as claimed in claim 24.

Claims 25-27 are indicated under this section by virtue of their dependency.

The prior art of record neither teaches nor reasonably suggest the additional method step of taking the first and second images using different rows of the detector, as required by the combination as claimed in claim 30.

Claims 31 and 32 are indicated under this section by virtue of their dependency.

*Response to Arguments*

Applicant's arguments filed July 10<sup>th</sup>, 2006, have been fully considered but they are not persuasive. Applicants assert that neither Meno nor Haendle specifically disclose making a difference image from two images that are taken at different cardiac cycles, as required by claim 22. Further, applicants assert that it is not obvious over Haendle to instruct the patient to hold their breath as required by claim 23, nor is it obvious to enhance an image for calcium deposits, as required by claim 28, in each case citing the lack of evidence of record. The examiner respectfully disagrees.

First regarding the prior art reference Meno with respect to claim 22, the examiner agrees that an image interval of 1/30 of a second does not necessarily constitute two different phases of the heart. However, such an interval was a suggestion by Meno, and that interval was not meant to be the only time interval contemplated by the reference. Furthermore, as the imaging process progresses, there will be a point in time at which the heart will be in the next phase, which would be evidenced at least by the output of the physiological signals 22, and the images taken immediately before and after that point in time ( $I_n$  and  $I_{n-1}$ ) will represent different phases of the heart, which are then subtracted as dictated by the formula described in Meno.

Therefore, Applicants' arguments are not persuasive, and the rejection is maintained.

Second regarding the prior art reference Haendle with respect to claim 22, it can be no more clear than lines 43-50 of col.1 that Haendle specifically subtracts two images, each being taken at a different phase of the cardiac cycle. The details that Applicants cited from Haendle

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merely describe how the subtraction takes place, which is pixel-by-pixel in the digital domain.

That has no bearing on the fact that the images are 1) of different cardiac phases, and 2) are subtracted, which is all that is required by the claim.

Therefore, Applicants' arguments are not persuasive, and the rejection is maintained.

Third, regarding claim 23 as being obvious over Haendle, the examiner asserts that sufficient evidence of record has been provided in order to support the examiner's assertion. Specifically, the previously-cited Riazat specifically cites references on pp.2 and 3 that describe the common practice of breath holding in order to essentially eliminate harmful image artifacts caused by motion due to the respiratory cycle. Several of the references cited specifically disclose breath holding in the titles. It is the examiner's assertion that the disclosure of the reference is sufficient evidence of record. Furthermore, the examiner wishes to remind the applicant that one of ordinary skill has been using breath holding techniques for more than 40 years in X-ray imaging and therapy applications.

Therefore, Applicants' arguments are not persuasive, and the rejection is maintained.

Fourth, and finally, regarding claim 28 as being obvious over Haendle, the examiner asserts that sufficient evidence of record has been provided in order to support the examiner's assertion. Specifically, the previously-cited Kruger '926 states in the Title and Abstract that images are enhanced after acquisition in order to accentuate a desired feature; in the case of Kruger, the desired feature is the movement of a bolus of contrast agent. One of ordinary skill readily recognizes that image enhancement is routine, since there is noise in the digital image



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caused by the detector and the circuitry as well as scatter and aliasing (when using a grid) in the detected image. A generic recitation of “enhancement” does not distinguish over the prior art of record nor the knowledge of one of ordinary skill in the art.

Therefore, Applicants’ arguments are not persuasive, and the rejection is maintained.

### *Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485.

The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas R. Artman  
Patent Examiner

*TR Artman* 7/26/00

*Edward J. Glick*  
EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER